



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8**

1595 Wynkoop Street

11 August 2015

**MEMORANDUM**

**SUBJECT:** Screening Levels for Recreational Receptors at the Gold King Mine Site

**FROM:** Susan Griffin,

**TO:** Wendy O'Brien

Following the release from the Gold King Mine Site in August 5<sup>th</sup> into the Animas River, a concern exists for the safety of recreational users of the river. I've provided risk-based screening levels for inorganics in both surface water and soil/sediment for a hiker/ camper to compare to measured data. Table 1 shows screening levels for the hiker/camper exposed to surface water. These levels assume that adults and children receive all of their daily water intake (2 liters/day) from the river over a 64 day period. Table 2 shows the screening levels for the hiker/camper exposed to soils and sediments alongside the riverbank. They also assume that adults and children receive all of their daily soil intake over a 64 day period. These screening levels represent levels which are without adverse non-cancer effects over a chronic period of time. Screening levels based on shorter exposure periods (such as those expected at the Gold King Mine site) would be much higher and less conservative. The exposure assumptions for those screening levels are provided as attachment 1. The toxicity values are in attachment 2.

These screening levels represent a bounding estimate for recreational users. This means they are more conservative than screening levels for fisherman, rafters, swimmers, or other recreational users of the river primarily because their consumption of water and soil/ sediment is higher. These values don't take consumption of fish from the river into consideration. Please feel free to contact me if you have any questions (303) 312-6651.

**Table 1 – Screening Values in Surface Water for Hikers/ Campers**

Analyte	Screening Level (ug/L)
Aluminum	170,000
Arsenic	50
Barium	33,000
Beryllium	330
Cadmium	83
Chromium	210,000
Cobalt	50
Copper	6700
Iron	120,000
Lead	200
Manganese	7800
Nickel	3300
Thallium	1.7
Vanadium	830
Zinc	50,000

**Table 2 – Screening Levels in Soil/ Sediment for Hikers and Campers**

Analyte	Screening Level (mg/kg)
Aluminum	3,300,000
Arsenic	4200*
Barium	670,000
Beryllium	6700
Cadmium	1700
Chromium	4,300,000
Cobalt	1000
Copper	130000
Iron	2,300,000
Lead	20,000*
Manganese	160,000
Mercury	1000
Nickel	67,000
Thallium	33
Vanadium	830
Zinc	50,000

\*Screening levels for lead and arsenic include site-specific adjustments for bioavailability

## Attachment 1

### Exposure Parameters for Hikers/ Campers

Exposure Pathway	Exposure Parameter	Units	RME Value	Source
General	Body weight older child	Kg	44	[4,d]
	Body weight adult	Kg	70	[1]
	Exposure Frequency	Days/yr	64	[7,a]
	Exposure duration child	Yr	10	[7]
	Exposure duration adult	Yr	20	[7]
	Total exposure duration	Yr	30	[2]
Ingestion of Surface Water as Drinking Water	Ingestion rate	L/day	2	[1,2]
Ingestion of soil/ sediment	Ingestion rate	Mg/day	100	[7,c]
	Conversion Factor	Kg/mg	1E-06	[2]
	Hazard Index	unitless	1.0	[2]

#### Sources

- [1] USEPA 1991. Standard Default Exposure Factors. OSWER Directive 9285.6-03
- [2] USEPA 1989. Risk Assessment Guidance for Superfund. Volume 1, Part A
- [4] USEPA 2011. Exposure Factors Handbook
- [7] Professional Judgement

#### Notes

- [a] Assumes exposure occurs over the course of 16 weeks at a frequency of 4 days/week
- [c] Assumes soil ingestion by a hiker is similar to that of a resident
- [d] Age-weighted average based on body weights of children 6-11 years old and 11-16 years old

## Attachment 2

### Toxicity Factors

Analyte	RfD
Aluminum	1.0E+00
Antimony	9.0E-04
Arsenic	3.0E-04
Barium	2.0E-01
Beryllium	2.0E-03
Cadmium (non-water)	1.0E-03
Cadmium (water)	5.0E-04
Chromium (III)	1.5E+00
Chromium (VI)	3.0E-03
Chromium (6:1)	1.3E+00
Cobalt	3.0E-04
Copper	4.0E-02
Iron	7.0E-1
Manganese (food)	1.4E-01
Manganese (non-food)	4.7E-02
Mercury	3.0E-04
Molybdenum	5.0E-03
Nickel	2.0E-02
Selenium	5.0E-03
Thallium	1.0E-05
Vanadium	5.0E-03
Zinc	3.0E-01